MICHAEL D. BOLON

GENERAL DYNAMICS
LAND SYSTEMS DIVISION
Engineering Design & Development

Mr. Bolon is the Senior Vice President of Engineering, Design and Development, which expands upon his previous role through the addition of responsibilities for the Engineering operations at the GDLS-California Technical Center, GDLS-Canada and the Robotic Systems Technology Research and Development in Maryland. Mr. Bolon also serves as President, Eagle Enterprise, a General Dynamics company focused on System-of-Systems Technology Integration.

He was appointed Vice President, Engineering Design and Development in August 2000, responsible for Research and Development, Systems Engineering, Product Design, Systems Integration Prototype Fabrication, Testing, and Logistics Engineering for General Dynamics Land Systems.
Mr. Bolon joined Chrysler Corporation in 1968 as an engineer in the defense power train engineering department. In 1972 he was appointed manager of engine and power train engineering. He led the design and development of the propulsion system for the M1 Abrams Tank from concept into production. In 1980 Bolon was appointed manager of system integration which included responsibility for production liaison engineering as well as system level design.

In 1982, General Dynamics acquired Chrysler Defense and Mr. Bolon was named Deputy Program Manager for Tank Programs and led the engineering program for the M1A1 Tank which later performed so well in Operation Desert Storm.

From 1986 to 1991 Mr. Bolon was the General Manager of Armored Vehicle Technologies Associated, a joint venture between General Dynamics and FMC Corporation.

Mr. Bolon was appointed director of all advanced programs in 1992. He was appointed Vice President for Amphibious Systems in Woodbridge, VA in July 1996. He led the winning competitive effort for design and development of the U. S. Marine Corps Advanced Amphibious Assault Vehicle.

In 1999, Mr. Bolon was appointed Vice President, Production & Delivery and was responsible for manufacturing for all Domestic and International production programs.

Mr. Bolon received his Bachelor of Science degree in Mechanical Engineering in 1968 and a Master of Engineering in 1972, both from Wayne State University in Detroit, Michigan.

Mr. Bolon and his wife Kathy reside in Oakland, Michigan.

Armaments for Full Spectrum Warfare:

Advanced Technology Programs and Opportunities for Lethality Enhancements

Mike Bolon

Senior Vice President

Engineering Design and Development

General Dynamics Land Systems

Agenda

- Introduction
- Advanced Technology Programs
- What’s Next?

GDLS – Full Spectrum Product Offering

DEMO III Robot

Enabling Technologies

Stryker MGS

Light

AAAV

Medium

M1A2 SEP

Heavy

Disruptive Technologies Drive Change

- Disruptive Technologies
  - Technologies that cause change in Warfighting and / or Integration

- Examples:
  - Electric (hybrid) drive - propulsion: mobility, lethality and survivability
  - Autonomous navigation: robotic enabler
  - Networked systems: “See First, . . . , Finish Decisively” enabler
  - Linked software architectures: “See First, Act First” enabler
  - Active Protection: Protected Space, Lightweight

Opportunities for Lethality

- A Few Examples:

  - Robotics:
    - ARL - Robotics CTA
    - TACOM - Vetronics Technology Integration

  - System of Systems and Full Spectrum Operations: Natick / PM Soldier - Objective Force Warrior

  - Manned Ground Platforms: FCS- Mounted Combat System

1st Disruptive Technology

Robotics:

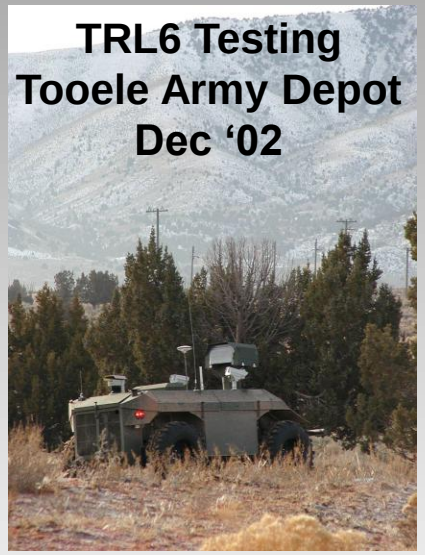
Autonomous Mobility and Intelligent Control

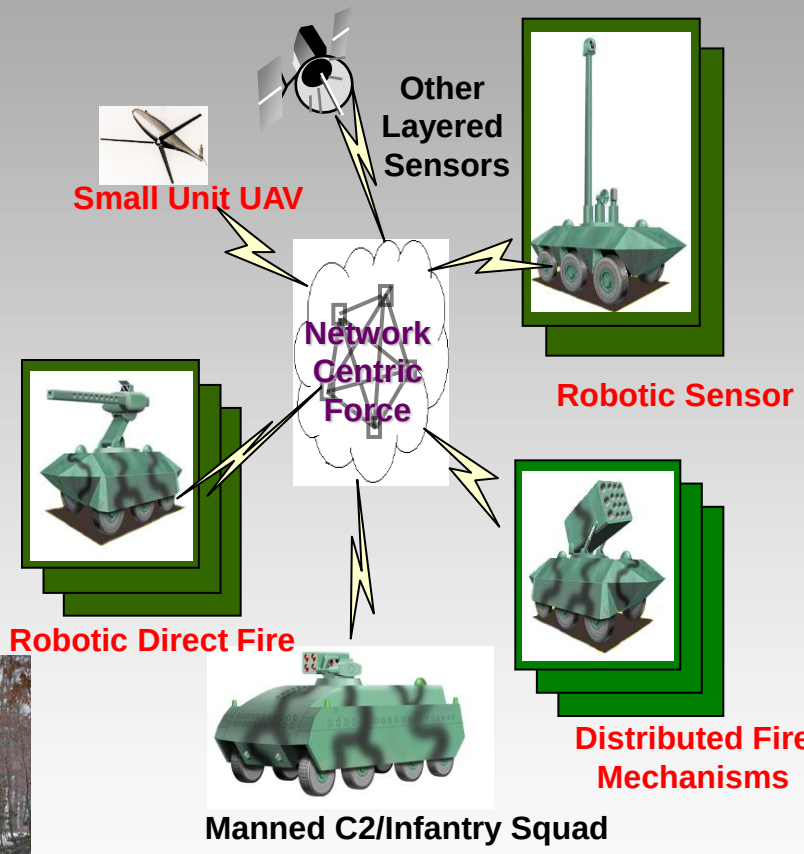
Vetronics Technology Insertion and Lethality Integration

Advanced Robotic Perception

Robotics
Vision

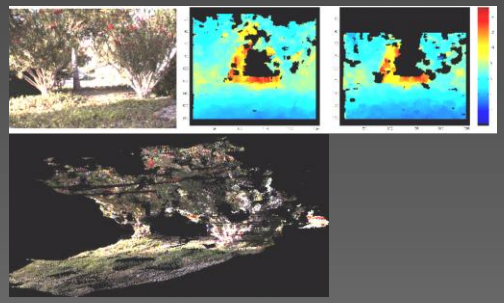
Develop & demonstrate critical robotics technology required to enable formation of the Objective Force





Autonomous mobility is key to multiple future military missions

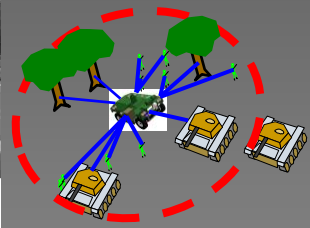
Advancing Perception Technology

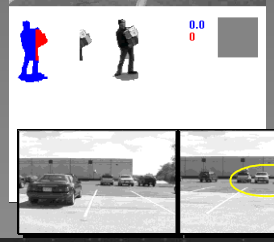


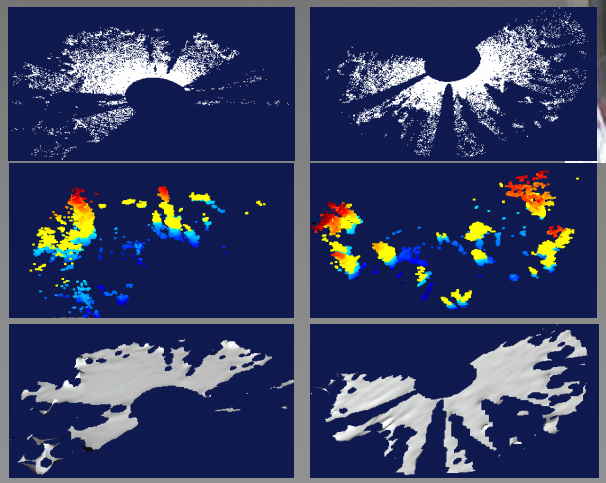
Stereo Imaging in complex environments

Tracking unstructured road networks

360° Safeguarding

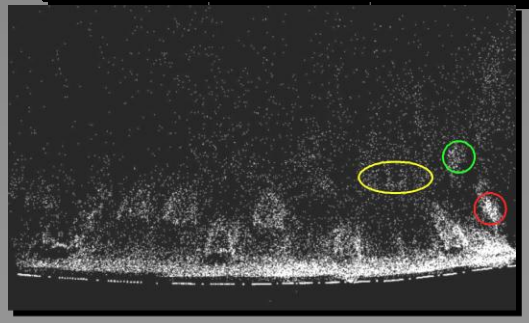






New Ladar processing algorithms recovering surface structure

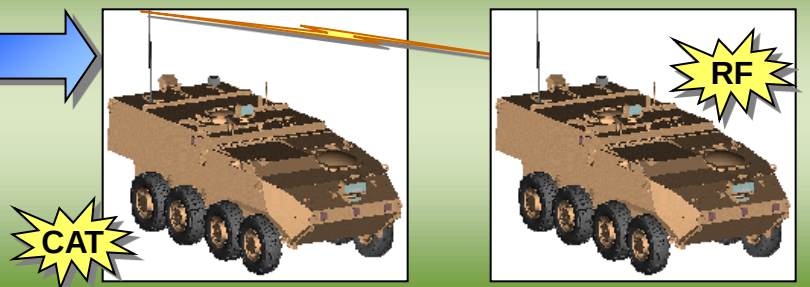
Object classification using thermal imagery



Mid-range perception motion stereo

Vetronics Testbed Approach

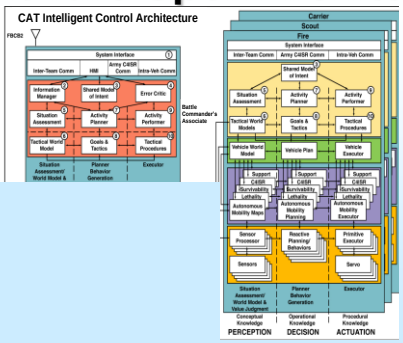
Except for Crew Related Systems, much of the CAT and RF Architecture is Identical



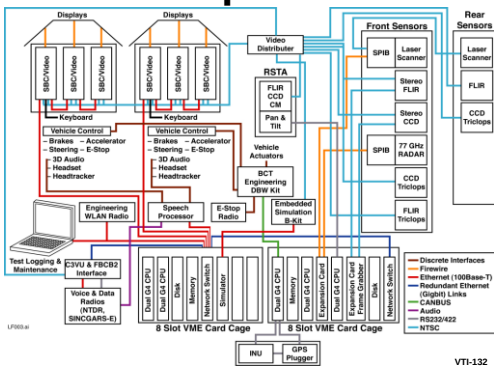
The Common Architecture Involves:

- Autonomous Mobility
- Obstacle Detection
- Mission Planning
- Software
- Hardware
- Intelligent Agents
- Sensors
- Drive-by-Wire

Software Open Architecture



Hardware Open Architecture



Ft. Bliss TARDEC VTI Demonstration

March 2003

2nd Disruptive Technology

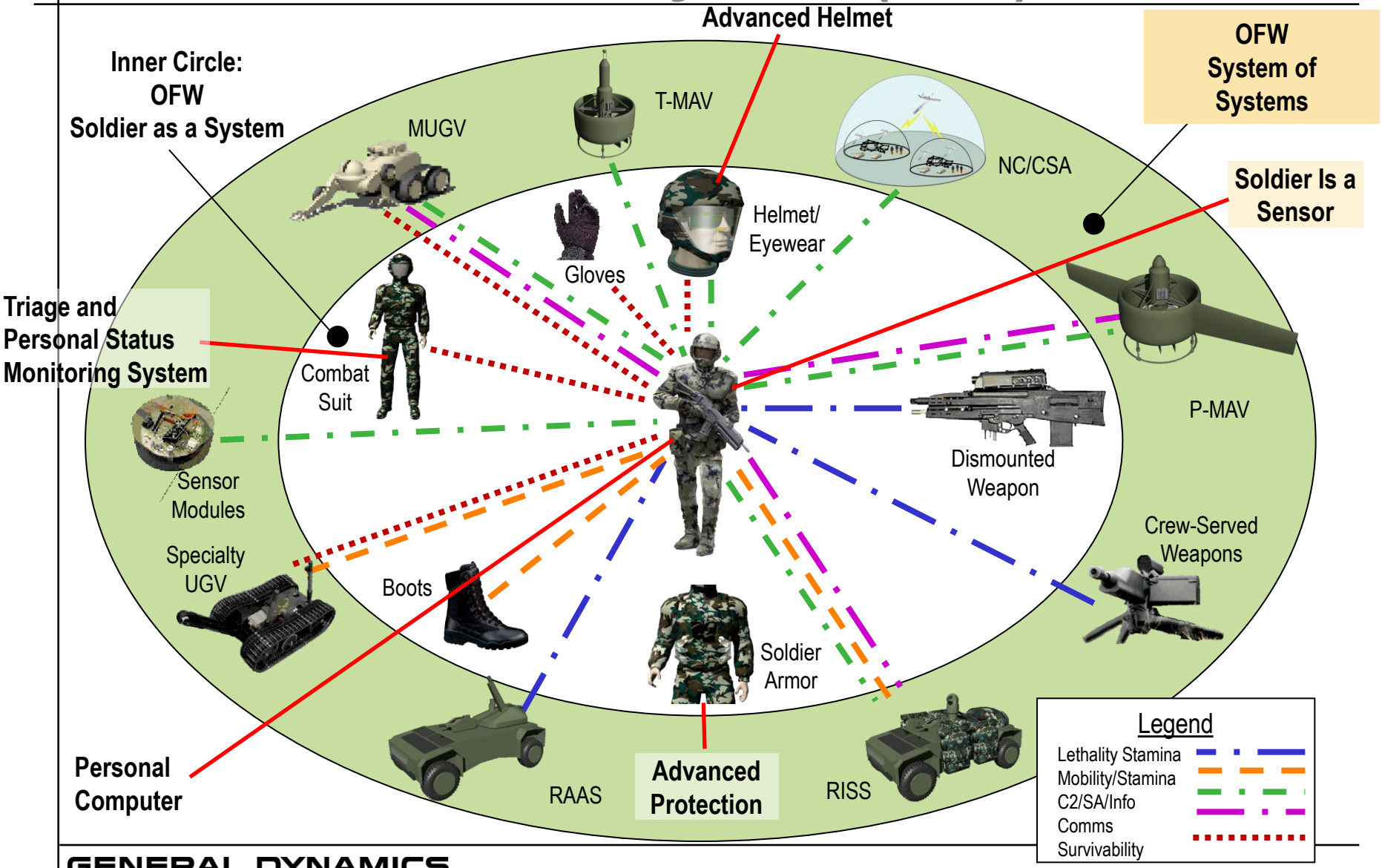
Objective Force Warrior - System of Systems:

Netted Communications / Collaborative Situational Awareness

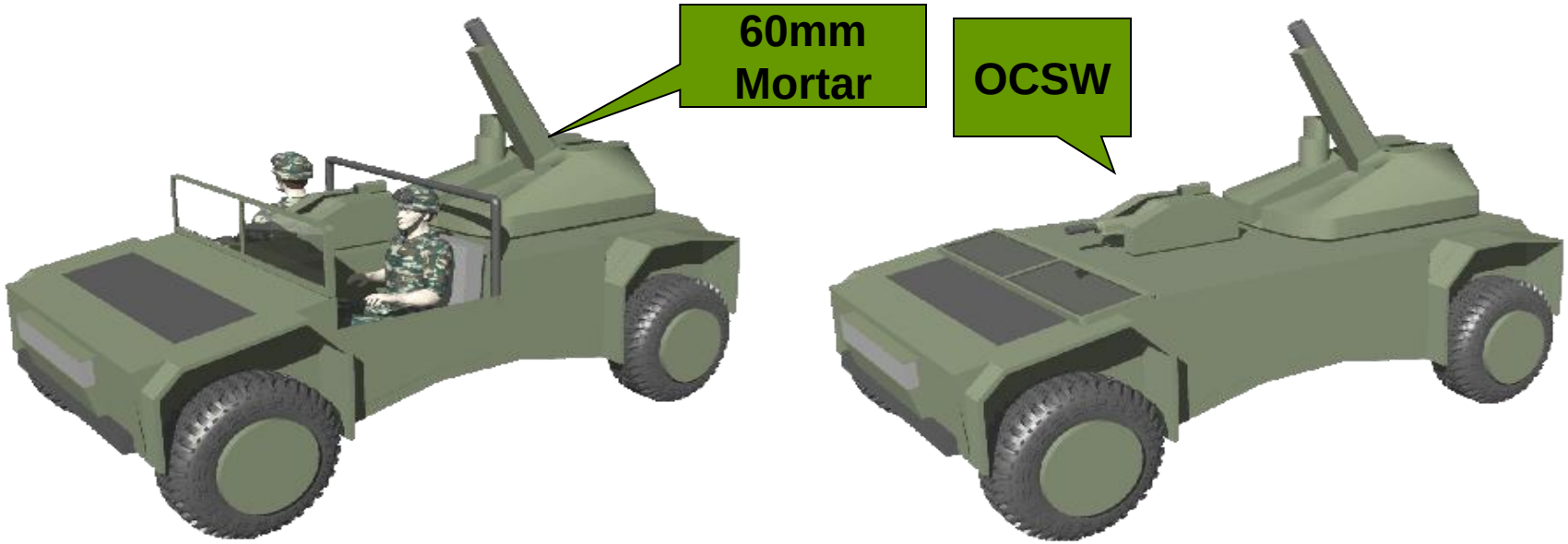
Enhanced Lethality

Support with Robotics (Assault and Mule)

OFW Soldier as a System (SoS)



OFW Robotic Armored Assault System Concept



Eagle's OFW Concept for Robotics:

- **2 versions - RISS (Mule) and RAAS (Assault)**
- **5,500 GVW w/ ~ 2,000 lbs. payload**
- **Autonomous mobility, robotic follower, manned capable**
- **RAAS provides direct and indirect fire support - "Netted"**
- **RISS provides logistics support - off-loaded soldier items, resupply, embedded training, C2, etc.**

OFW Robotic Armored Assault System - Demo

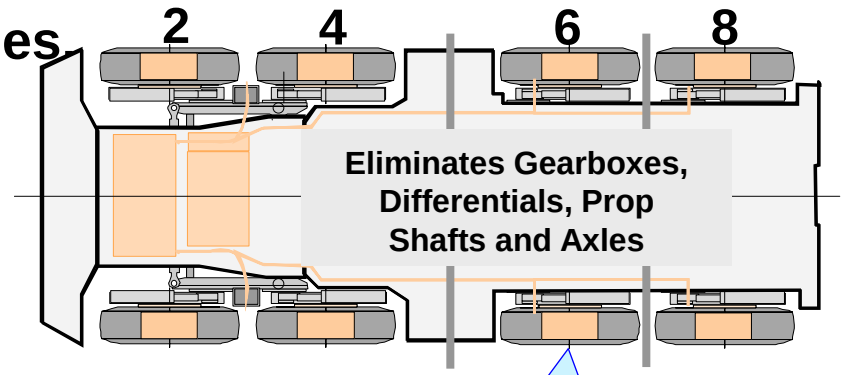
3rd Disruptive Technology

Hybrid Electric Propulsion -

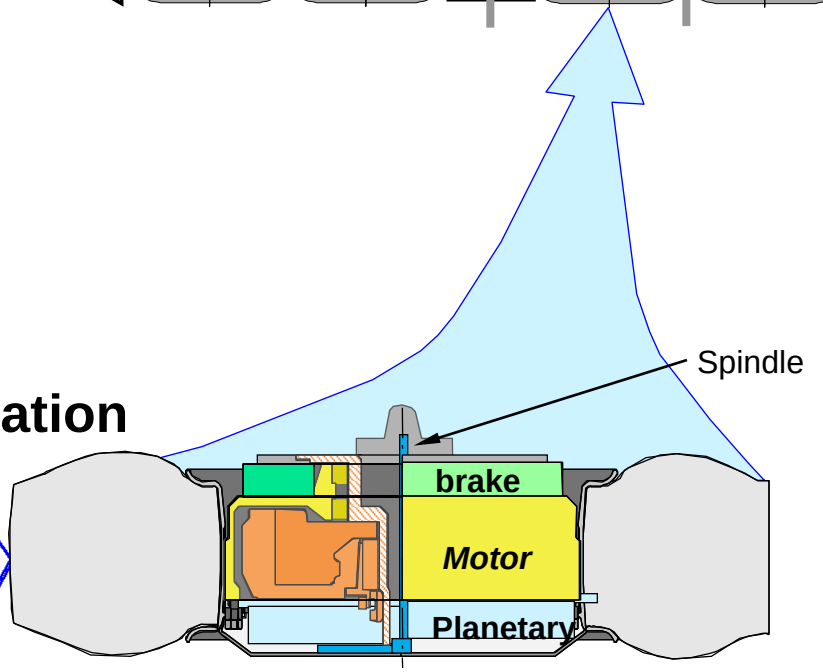
Supporting Lethality and Family of Vehicles

In-Hub Drive – Enables Modular Approach

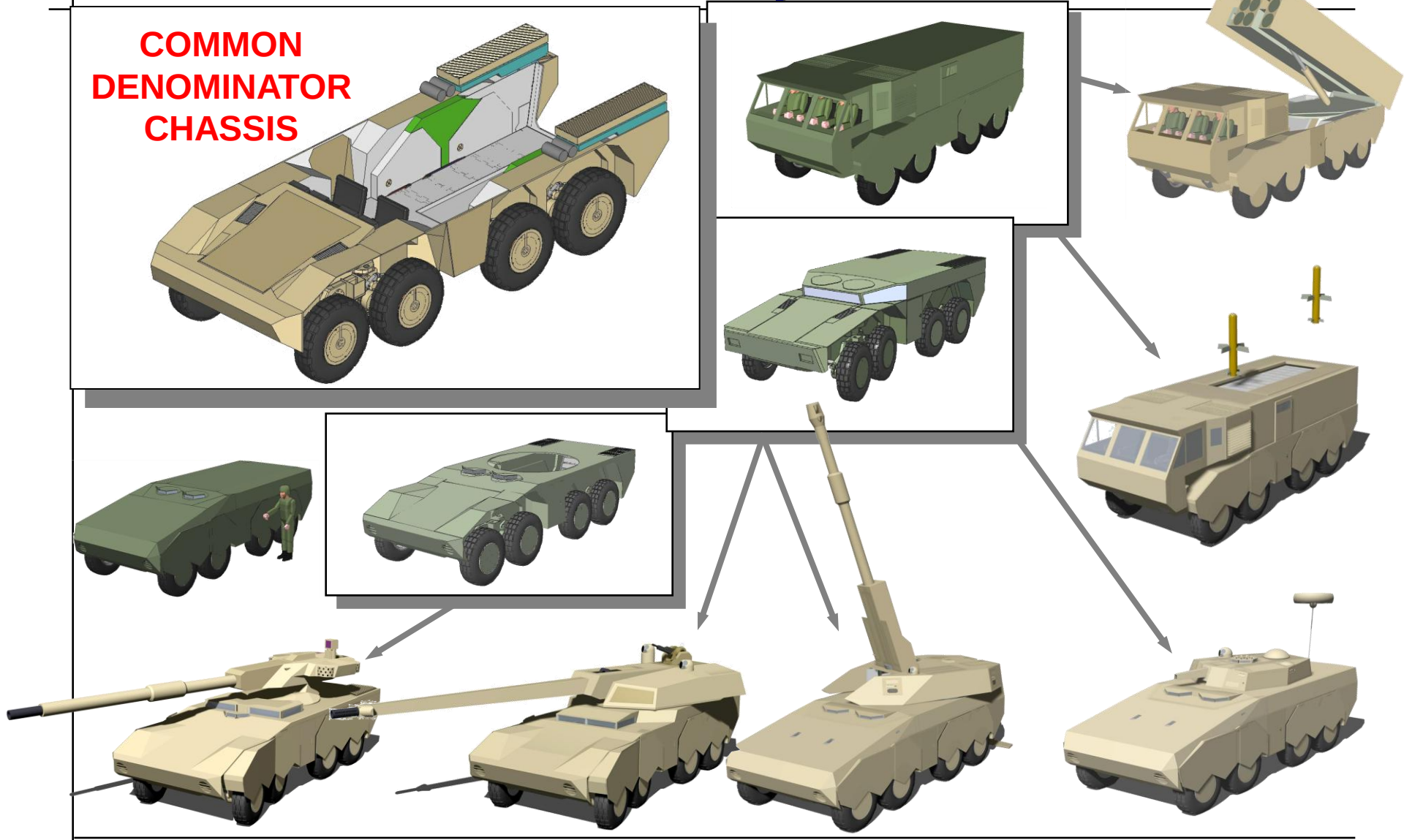
- Low, Wide Cargo Bed Accommodates All Broad Range of Mission Modules both Combat and Tactical
- Manage Torque at Each Wheel for Ultimate Trafficability
- >4x Redundancy
- Modular
  - Interchangeable
  - Use 2, 4, 6 or 8 Drive Modes
- Direct Access from Outside
- Most Benefit from E-drive Application



Permanent Magnet Motor
- High Torque and Dynamic Range
- Efficient, Quiet
- Simple, Robust



16-18 Ton Class Common Chassis: Multi-Mission Module Compatible



LOS / BLOS ATD

- **Program Description**
  - 120mm LOS /BLOS ATD
  - Tech Base Development in Support of
    - Lightweight 120mm Gun
    - Ammunition Handling System
    - Advanced Fire Control Technologies
  - Transitions MRAAS Technologies to MCS
  - Supports FCS MCS Program Plan

- **Current Status**
  - Existing Contract in Place
    - MRAAS TMM-WC Awarded in Apr ‘02
    - Contract Restructure for LOS / BLOS ATD
  - Control Development
    - Support to Block I MCS Development
    - Block 2+ Advanced Fire Control Development
  - AHS Tech Base Development, Expected Contract Mod by Jun ‘03

Concluding Comments -- What's Next?

- Active Protection
- Nano-Technology
- Electro-Magnetic Armaments
- Directed Energy